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How to use the display program DISP

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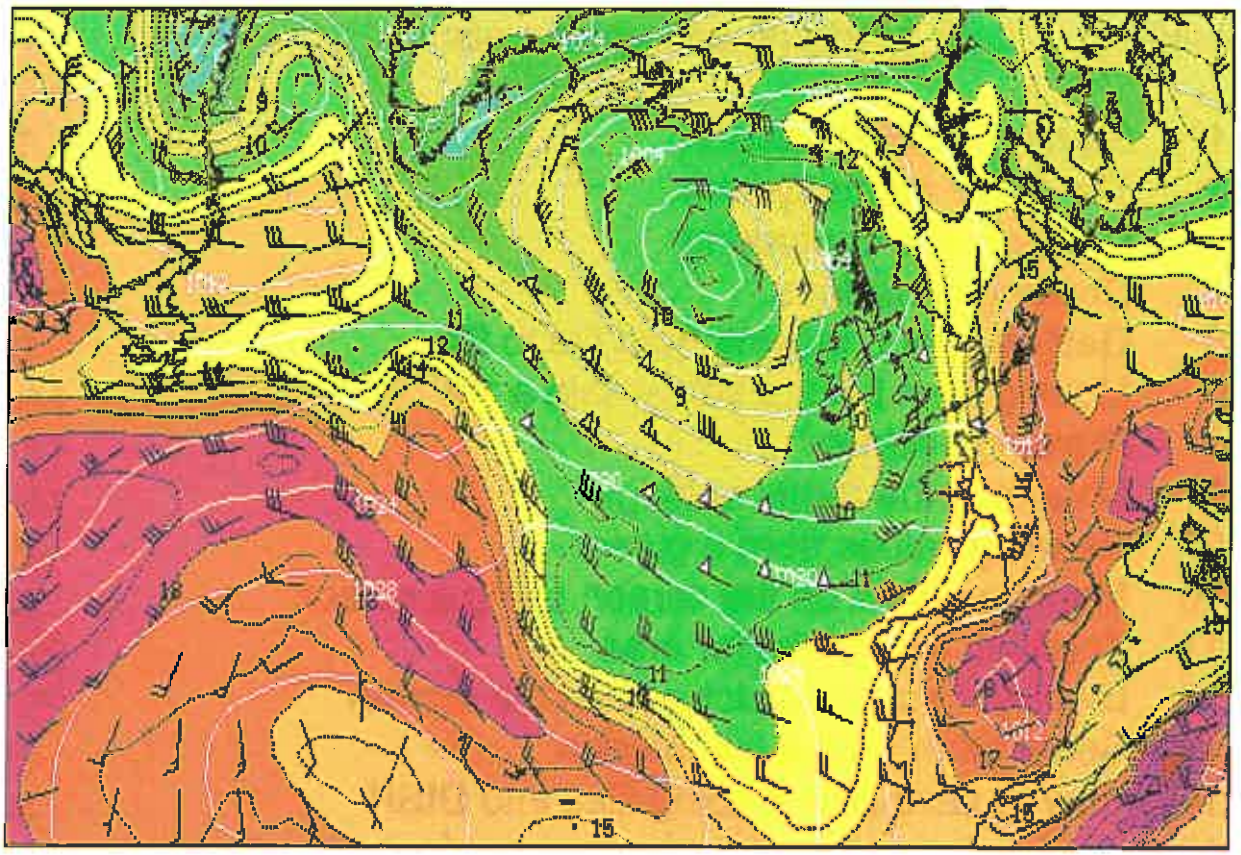
How to use the display program

DISP



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DISP

The aims of this guide are:-

(1) To give a short overview of what DISP is and what it can do.
(2) To introduce the essential commands for any new users to DISP to try out.
(3) To provide a reference of the basic commands.
(4) To provide a minimal quick reference set of commands (pp 36-37)

1.1 What is DISP?

DISP is a PC based program written in turbo pascal. It is used to display interactively a wide variety of meteorological fields on a grid covering western Europe and the North Atlantic. DISP does not work primarily by bringing up menu options, instead commands are issued by pressing the relevant keys on the keyboard. This means, of course, that those relevant keys have to be learnt if DISP is to be used effectively. Learning lots of keys may seem daunting, but actually it is quite easy to learn the most important ones reasonably quickly. A menu system containing a reference list of all the keys is built in to the program. Once the basics have been mastered, DISP becomes a very quick and effective tool for the study of mid-latitude weather systems.

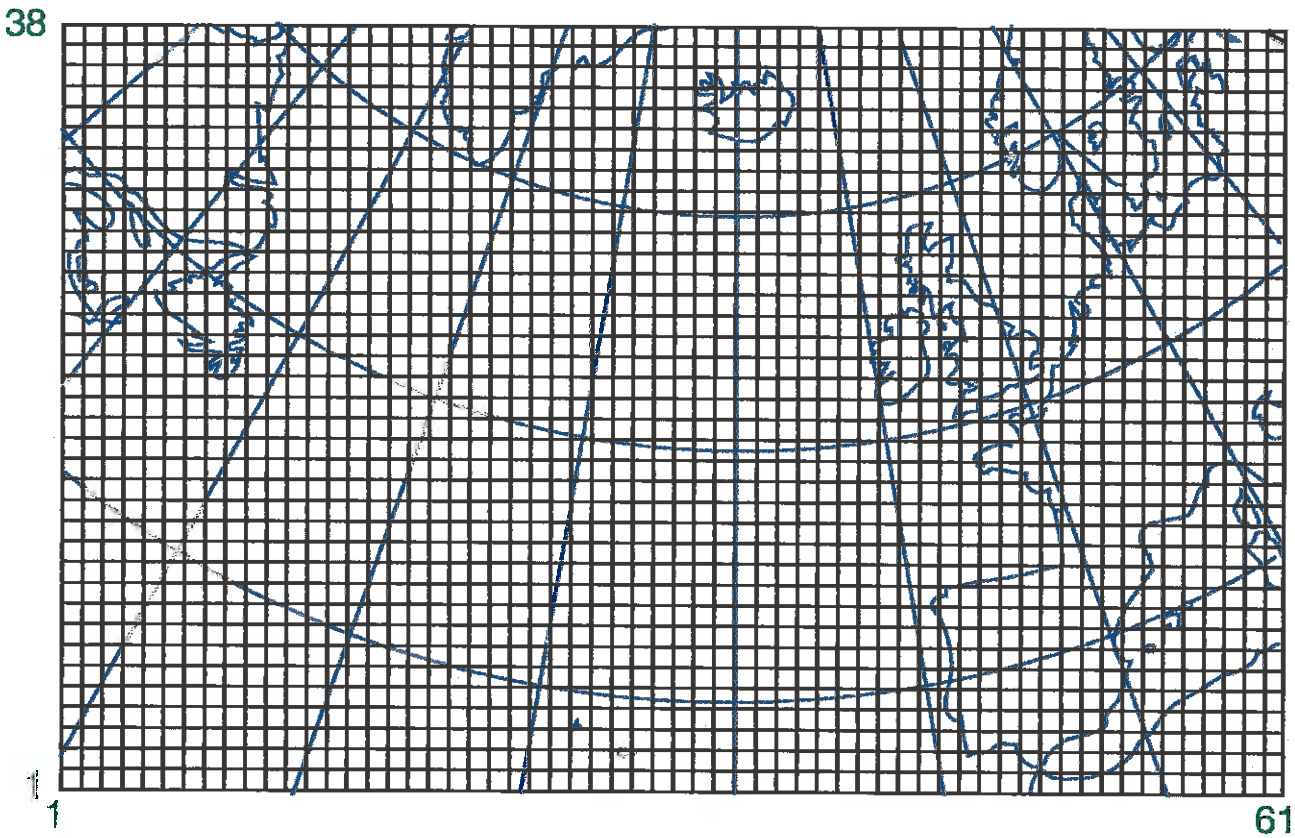
1.2 A bit of history and the people involved.

DISP originally arose from Sid Clough's experience around 1985 of using a BBC home computer to animate satellite imagery and it was Sid Clough who took the lead role in DISP's early development. The original code was developed in JCMM by Russell Franks in order to study of cases from the FRONTS 87 experiment which took place in 1987. The programs to generate the numerical model diagnostics were originally written by Nick Dixon and Sid Clough. Since then DISP has continued to expand. From 1991 up to 1997 substantial and innovative improvements have been made by Tim Hewson and Andy Macallan. Vacation students Chris Court, Steve Pusey and Tyrone Fay have also made important contributions to DISP's development.

1.3 What does DISP display?

(1) A large range of diagnostics from the UK Met Office (UKMO) Limited Area Model (LAM). At the time of writing this, the LAM is about to be replaced by the high resolution global model.
(2) Infra-red, visible and water vapour satellite imagery. The images come from the UKMO autosat system.
(3) Composite radar pictures of rainfall rates from the UK radar network.
(4) Sferics - lightning strokes detected by the UKMO ATD system.
(5) Surface observations from synoptic reports. (These are not routinely put into a DISP file format.)
(6) Anything else contained in a file with a format that DISP can read.

1.4 The DISP grid



The region over which DISP can display is shown above. Fields can be displayed on this area or on a smaller sub area. The grid is polar-stereographic with 20°W as the vertical meridian. The boxes show the resolution at which numerical model diagnostic fields are generated for DISP. Each grid box is approximately 100x100km.

1.5 About the numerical model diagnostic fields

The model diagnostic fields which DISP reads will have been generated by a suite of FORTRAN programs called MDIAG. The details of MDIAG are beyond the scope of this guide and will not be covered here.* What will be mentioned is the type of output files MDIAG programs generate for DISP. MDIAG programs can generate files which contain a large number of 2-dimensional fields of a large number of diagnostic quantities e.g. 500mb geopotential height or vorticity on a 315K isentropic surface.

The most frequently generated fields are:-

- **Diagnostics quantities on 1000, 900, 700, 500 and 300mb pressure levels.**
- **Diagnostic quantities on 315K and 330K isentropic surfaces.**
- **Diagnostic quantities on potential vorticity = 2pvu and 1.5pvu surfaces.**
- **1000-500mb thickness.**

Diagnostics on many other levels/surfaces - such as wet-bulb potential temperature or relative humidity could also be calculated. All these diagnostics are currently generated by MDIAG from 3-dimensional fields at the horizontal resolution shown on the previous page (around 100km) and a vertical resolution of 100mb.

1.6 Filename convention for DISP readable files

Since DISP is a PC based program run under DOS, the usual 8 character + 3 character extension restriction to the length of filenames applies. At JCMM we follow a filename convention for all the different types of DISP readable files that are regularly generated here. It is very likely that you will comes across files named in this way if you use DISP. A description of how the filename convention works, and how this applies to the most frequently used types of dataset we deal with, is given in the next couple of pages.

* For more information about MDIAG see JCMM report No 69 by Peter Panagi & Ed Dicks

1.6 continued Filename convention - Model files

Filenames take the form **uaddmmyy.00p**
or **faddmmyy.42p** ... etc ...

where **dd** is the **day, mm** the **month** and **yy** the **year.**
(The case is not important)

Files containing diagnostics on a **1000mb** pressure level have a **.00P** ending -
.90P for **900mb**
.50P for **500mb**
etc
Files containing diagnostics on a **315K** isentropic surface have a **.42P** ending -
.57P for **330K** (330K ~ 57degC)
etc
Files containing diagnostics on a **PV=2** surface have a **.P20** or **.PVP** ending -
.P15 for **PV=1.5** surface
Files containing **1000-500mb thickness** have a **.05P** ending.

Files that start **ua** contain a single day's worth of diagnostics at 8 times - 00, 03, 06, 09,12,15,18 and 21 UTC. The diagnostics at 00, 06, 12 and 18 UTC come from model analysis, the other times 03, 09, 15, 21 UTC are from 3 hour forecasts.

Files that start **f** contain a 48 hour forecast. Diagnostics are every 3 hours.
Files from a forecast starting at **00**UTC start **fa**
Files from a forecast starting at **06**UTC start **fb**
Files from a forecast starting at **12**UTC start **fc**
Files from a forecast starting at **18**UTC start **fd**
(This may change with the new global model)

Examples

e.g. **ua210397.50p** contains model analysis and 3 hour forecasts of diagnostic quantities on the 500mb pressure level for the 21st of March 1997.

e.g. **fc091096.p20** contains a 48 hour model forecast starting at 12UTC on the 9th October 1996. The file contains fields on a PV=2pvu surface every 3 hours.

1.6 continued Filename convention - Satellite images

Filenames for files containing a single satellite image take the form:

sihhhhdd.myy

Defines the area covered
s or **z**
s for an image over the whole DISP area
z for an image over a smaller sub area

Defines the type of image
i for infrared
v for visible
w for water vapour

hhhh is the hour, **dd** is the day, **m** is the month (1,2,3,4,5,6,7,8,9,a,b,c), **yy** is the year

e.g **sv120015.b98** File containing a visible image which covers the whole DISP area for 12UTC on 15th November 1998.

Files containing more than 1 satellite image have names which take the form

siddmmyy.nd

First two letters as for single image files

Time interval between images
h for images every half hour
1 for images every hour
3 for images every 3 hours

e.g **zw230697.3d** File containing water vapour images every 3 hours, over a smaller sub area for 23rd June 1997.

1.6 continued Filename convention - radar, sferics, observations

The naming convention is the same as for satellite images, except that the first two letters differ.

The first two letters could be :

rp radar on a polar stereographic grid.
ra radar on the national grid
sf sferics
ob surface synoptic observations

e.g **rp123005.297** File containing a radar image on a polar-stereographic projection for 1230UTC on 5th February 1997.

e.g **sf130896.3d** File containing sferics every 3 hours for 13th August 1996.

rp files may end .hd if a file contains half hourly pictures
ra files may end .qd or .hd for quarter or half hourly pictures.

Sferics (sf) and surface observation (ob) files are called point files. They contain information at point locations rather than on a grid.

Section 2

This section describes how to use DISP and introduces the most important commands.

2.1 Starting a DISP session

How you start up a DISP session will depend on the way the PC you are using is set up. Ask your system manager. Usually you will be able to type DISP at an MS-DOS prompt then hit Return or double click on the appropriate icon in Windows.

Once you have started DISP the following will appear

DISP

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Joint Centre for Mesoscale Meteorology
Department of Meteorology
University of Reading

Version 3.22

(3.22 was the latest version at the time this was written)

Enter the files you want to use. Type <RETURN> with no filename when all files have been entered. (Extra files can be entered after this stage.)

When you have entered all your files you can do either of the following :
1) Press the left mouse button or <SPACE> for main menu or,
2) Type the shortcut key for the required action.

File 1 :

Type a filename here e.g c:\files\ua140297.00p
then hit RETURN and enter another file if you wish,
or hit RETURN again if you wish to start the DISP session.
Up to 12 files can be entered.

If you wish to ABORT type Q then hit Return

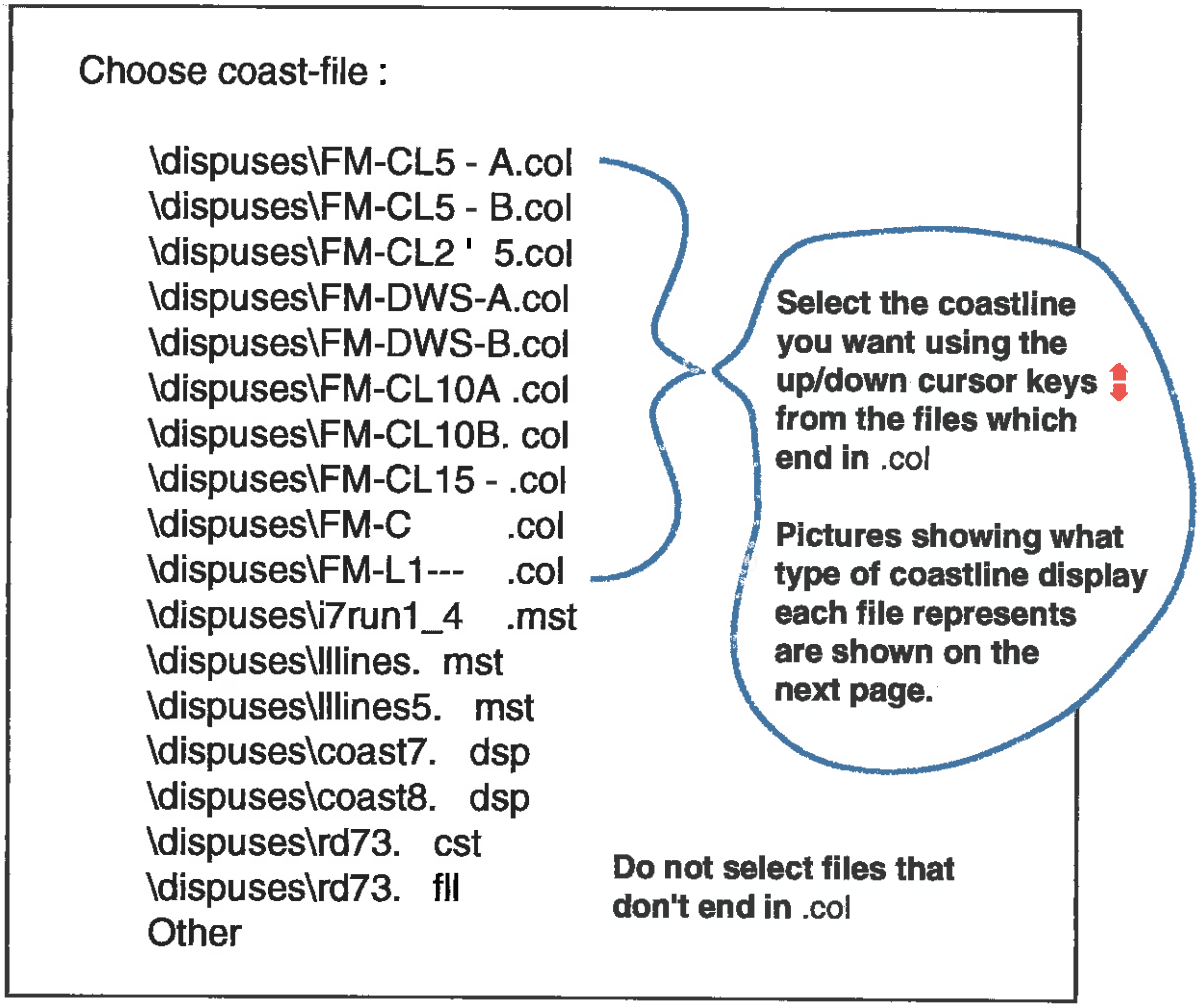
2.4 Drawing coastlines

DISP allows you to display coastlines with or without lines of latitude and longitude. Latitude and longitude lines can be displayed at 1°, 5° or 10° intervals.

There are four commands which cover everything you need to know about drawing coastlines with DISP .. Ctrl-Y, E, Ctrl-B and Alt-H.

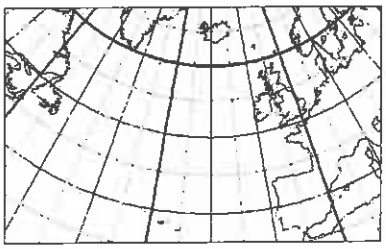
Ctrl-Y **To Draw a coastline. The first time you type Ctrl-Y a menu will be displayed asking you to choose a type of coastline.**

Menu displayed after typing Ctrl-Y

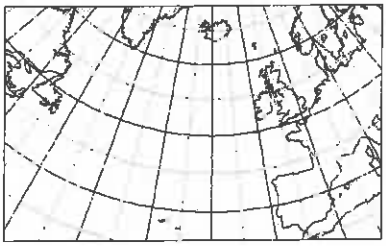


2.4 continued Drawing Coastlines

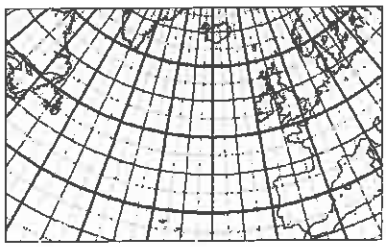
The different types of coastline file that are available.



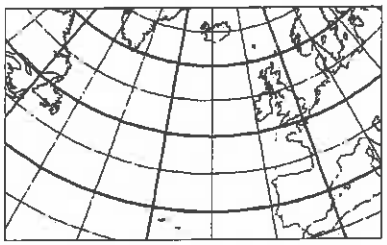
\dispuses\FM-CL5-A.col



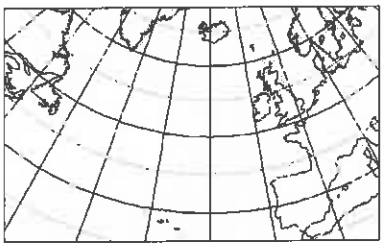
\dispuses\FM-CL5-B.col



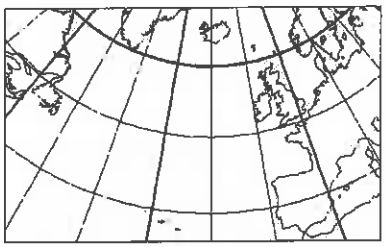
\dispuses\FM-CL2'5.col



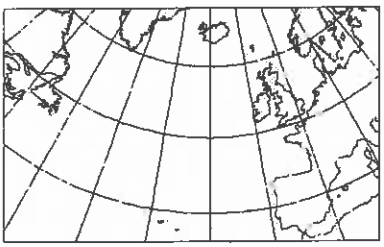
\dispuses\FM-DWS-A.col



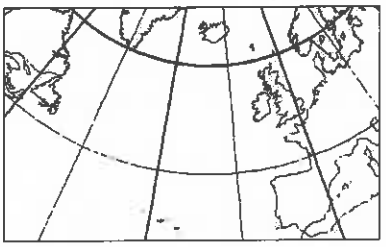
\dispuses\FM-DWS-B.col



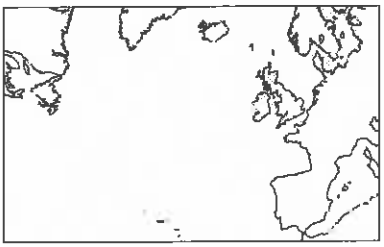
\dispuses\FM-CL10A.col



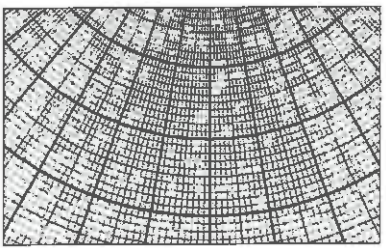
\dispuses\FM-CL10B.col



\dispuses\FM-CL15-.col



\dispuses\FM-C .col



\dispuses\FM-L1---.col

2.4 continued Drawing coastlines

E To toggle between generating or not generating a coastline automatically with every drawing, contouring or vector drawing operation. This can be very useful and saves time.

You will be asked

For all valid files (Y/N)

Hit **N** if you only wish to make this change for the current file loaded in memory. The **Y** option will make this change for all files containing model data but not for other files containing satellite or radar data. More information about files is given on the next page.
The menu asking you to choose a coastline type will be displayed if you havn't previously drawn a coastline using **Ctrl-Y**.

Ctrl-B To change the colour of the coastlines. You will get a menu. Use the up/down arrow keys ↕ and **Return** to select the colour you want.

Alt-H To change the coastline type. The menu listing all the coastline types is displayed.

2.5 Moving from one file to another in DISP.

When starting a DISP session up to 12 files can be loaded. These files could be of a variety of different types, eg model, satellite etc. DISP connects these files to "windows". By default, windows are connected to files in the order that the files are entered into DISP. i.e. file 1 is connected to window 1, file 2 is connected to window 2 etc.

At the start of a DISP session all DISP operations apply to window 1 which is connected to the first file entered. If you wish to perform operations on another file you must first transfer to the equivalent window. The numeric keys on the keyboard are used to move to other windows. Just press the number of the window you require.

2 Moves to window 2 which contains file 2.
3 Moves to window 3 which contains file 3

•
•

Alt 1 Moves to window 11 which contains file 11
Alt 2 Moves to window 12 which contains file 12

After moving to a new window the title at the top of the screen will change indicating that a new file is now ready in memory. Any drawing/contouring etc done on the previous file is still displayed. All new drawing, contouring and other operations will work on the new file connected to the new window.

It is possible to bring up a list of all the files entered in a DISP session.

F To list the files entered in a DISP session. You will get a menu. Use the up/down arrow keys ↕ and return to select option 1. List files. A list of the files, the window numbers and the type of files is displayed. Hit any key to remove the list.

2.6 Moving from one field to another within a file.

It is highly likely that the files you load into DISP will contain more than just one field (grid of data). A satellite file will often contain more than one image. A file containing output from the Met Office Unified Model will contain several quantities such as geopotential height and temperature at several times.

The following commands show how to list the fields within a file and how to move from field to field.

M To go to the field you require. To show a list of the fields within the file/window you are currently at.

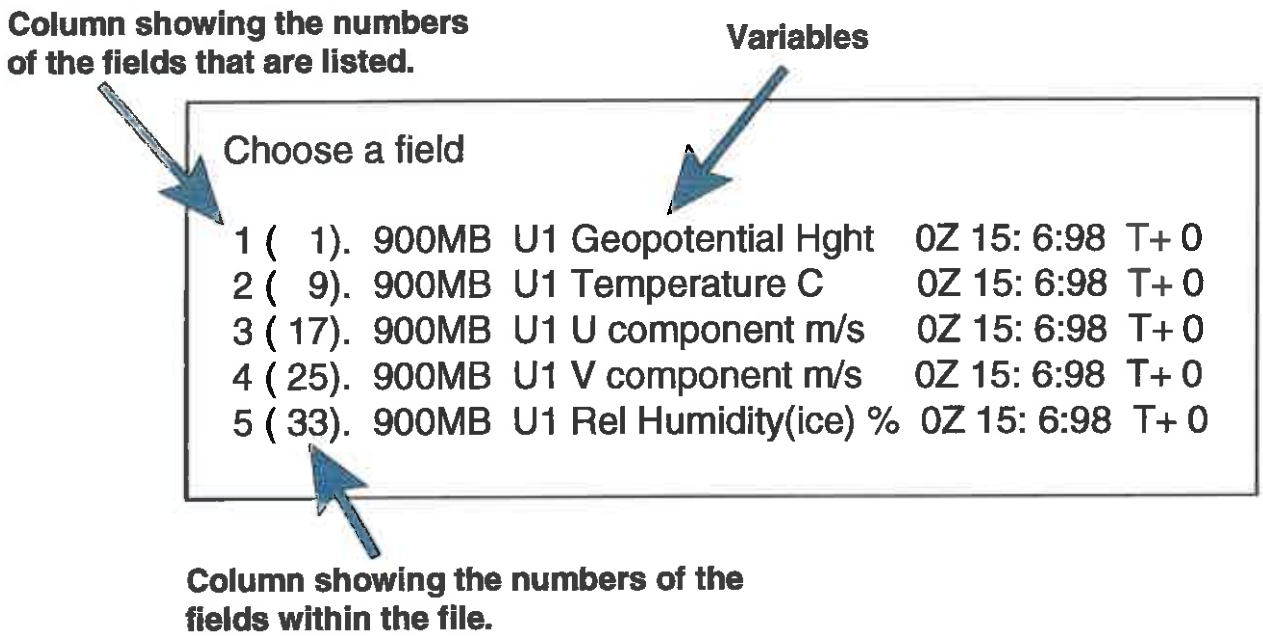
You will be asked the question Which field (Max n) : where n is the number of fields in the file. You can enter the number of the field you require if you happen to know what that number is. It may be for example that you want the temperature at 09Z and you know that it is the 12th field in the file, you could then type 12 Return to go straight to that field.

More often than not you will not know the number of the field you are looking for. In this situation you can just hit Return WITHOUT entering a number and bring up a list of the fields within the current file. A field can then be chosen by using the up/down cursor keys ↕ and Return.

Frequently, there are more fields than can be listed on one screen. They can still be displayed by scrolling down to the bottom of the list and keeping going - a new page will show the next lot.
As with moving to a new window/file, going to a new field will change the title at the top of the screen but leave the rest of the screen as it was.

2.6 continued Moving from one field to another

When listing the fields in a file using M, not all the fields may be listed. This is especially true for Unified Model files. Below is an example of the kind of list you are likely to get from M when the 'step' is not set to 1.



In this example there are 40 fields in the file, but only 5 are listed. The reason for this is that the 'step' has been set to 8. The 1st file is shown, then the next 7 are missed out, the 9th is shown then the next 7 are missed out .. etc. Only the 0Z field is listed for each variable. The 3, 6, 9, 12, 15, 18, 21Z fields are skipped. This is an important feature for dealing with large files which may contain hundreds of fields.

Moving around without using M

N Next - move forward one step. In the example above - to go to the next variable.

B Back - move backwards one step. In the example above - to go to the previous variable.

+ To go to the next field. This is not affected by the step and is usually a timestep.

- To go to the previous field. This is not affected by the step and is usually a timestep.

2.6 continued Moving from one field to another
Changing the step

U **To change the step. You will be asked the question Enter step : Type the step number you require and then hit Return.**

Example - Below is a possible field listing after using M, when the step is set to 8.

```
Choose a field

 1 (  1). 900MB  U1 Geopotential Hght   0Z 15: 6:98  T+ 0
 2 (  9). 900MB  U1 Temperature C       0Z 15: 6:98  T+ 0
```

Below is the new list when the step is changed to 1 using U. When the step is set to 1 all fields are shown using M, N acts the same as + and B acts the same as -.

```
Choose a field

 1 (  1). 900MB  U1 Geopotential Hght   0Z 15: 6:98  T+ 0
 2 (  2). 900MB  U1 Geopotential Hght   3Z 15: 6:98  T+ 3
 3 (  3). 900MB  U1 Geopotential Hght   6Z 15: 6:98  T+ 0
 4 (  4). 900MB  U1 Geopotential Hght   9Z 15: 6:98  T+ 3
 5 (  5). 900MB  U1 Geopotential Hght  12Z 15: 6:98  T+ 0
 6 (  6). 900MB  U1 Geopotential Hght  15Z 15: 6:98  T+ 3
 7 (  7). 900MB  U1 Geopotential Hght  18Z 15: 6:98  T+ 0
 8 (  8). 900MB  U1 Geopotential Hght  21Z 15: 6:98  T+ 3
 9 (  9). 900MB  U1 Temperature C       0Z 15: 6:98  T+ 0
10 ( 10). 900MB  U1 Temperature C       3Z 15: 6:98  T+ 3
11 ( 11). 900MB  U1 Temperature C       6Z 15: 6:98  T+ 0
12 ( 12). 900MB  U1 Temperature C       9Z 15: 6:98  T+ 3
13 ( 13). 900MB  U1 Temperature C      12Z 15: 6:98  T+ 0
14 ( 14). 900MB  U1 Temperature C      15Z 15: 6:98  T+ 3
15 ( 15). 900MB  U1 Temperature C      18Z 15: 6:98  T+ 0
16 ( 16). 900MB  U1 Temperature C      21Z 15: 6:98  T+ 3
```

2.7 Drawing vectors

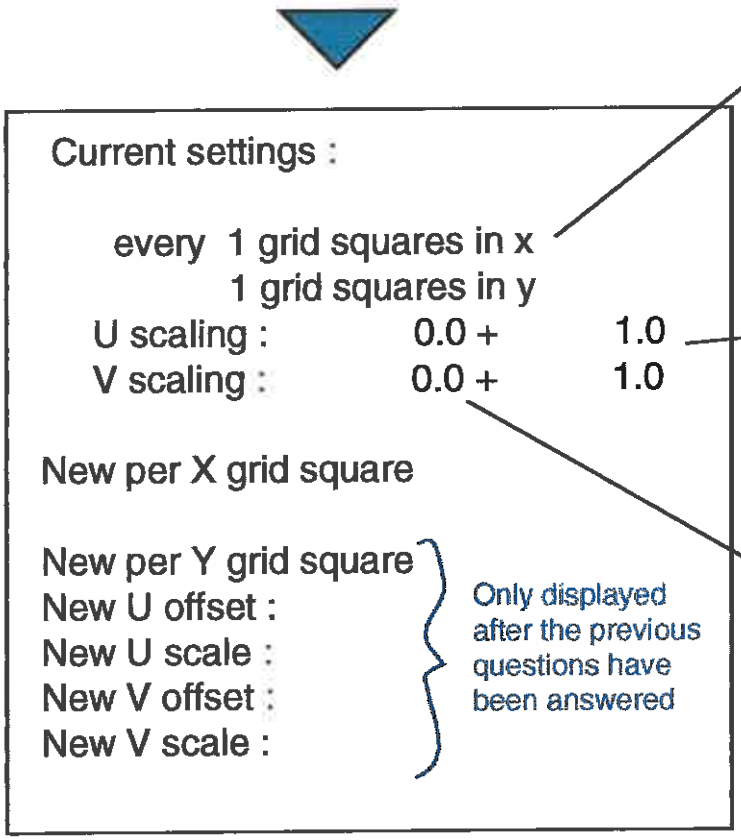
Primary keys Ctrl-W, V, : and F14.
Ctrl-W must be used before V to display vectors.

Ctrl-W **To choose the x and y components to display as vectors. You will be asked the question Which field (Max n) : in the same way as if you had hit the M key. Choose in the same way as using the M key for the x and y components. You are also given the option to colour vectors according to another field.**

V **To display vectors on the screen.**

: **To change the number of vectors per grid square, the scaling factor and the offset.**

Menu displayed after typing :



Vectors by default are displayed every grid square. If **New per X grid square** is changed to 2, vectors will be displayed every second grid point in the X direction. Change to 3 for every 3rd grid point etc. Similarly for Y

The multiplication scaling factor for each X,Y vector component. The questions **New U scale :** and **New V scale :** allow these values to be changed. The default is 1.0 for each component.

A value can be added to or subtracted from each vector component. The default is 0.0 for each component. The questions **New U offset :** and **New V offset :** allow these values to be changed. Example of use - to subtract a system velocity and display system relative flow vector.

Only displayed after the previous questions have been answered

2.7 continued Drawing Vectors

F14 **This is another kind of scaling where you choose the value that a unit vector is to represent. The length of the vectors will be modified accordingly. The larger the value a unit vector represents the shorter the vectors lengths are displayed when next typing V.**

A menu will appear. Use the up/down arrow keys ↕ to select the value you want. If you select other you will have to type in your own value.

Menu displayed after hitting F14

Select value for unit vector to represent :

Automatic scaling according to range — This is the default.
15 (eg for WINDS in ms-1)
20 (eg for WINDS in ms-1)
5 (eg for Q-VECTORS, E-16)
10 (eg for Q-VECTORS, E-16)
Other

Whenever the keys Ctrl-W, : or F14 are used, the vectors must be re-drawn using V to see the changes displayed. To clear the screen before re-drawing the vectors use F12 or Shift F2 (page 9).

You may have to use the + or - keys (or change the step using U) to get the times you require before selecting the vector components with Ctrl-W. (pages 15-16)

2.8 Changing the range settings

Primary keys R, Alt-U, Alt-R

When you first draw or contour a field, the range of values over which the field is displayed is pre-defined from information in the file. (This is called header defined)

e.g. **If 900mb θ_w is drawn, it is likely to be displayed over 14 ranges, every 3°C from -18 to 24°C. It may be that you would wish to display this field over fewer ranges every 2°C - to do this you need to use the R key.**

R **To choose new range settings for the file you are currently at. The panel shown below will be displayed.**

CURRENT WINDOW

Enter number of finite ranges :

1 through E (=14)

or H for header-defined
or O for single contours

Type in the number of ranges you want. in hexadecimal, ie (A=10, B=11 ... E=14). The maximum allowed in DISP is 14. (H will go back to the pre-defined settings, Use O if you only want to draw 1 contour). Once you have typed in a number of ranges - a new menu will then appear

This menu gives you a choice of different ways of setting up the ranges you want. Choose the method using the up/down arrow keys ↕ and then hit Return. The most useful and commonly used in the list are indicated with green arrows - they are described on the next page.

Enter range setting choice :

Linear, using full range
Logarithmic, ""
⇛ User-defined Max/Min (fixed)
➔ User-defined Max/Min (variable)
Non-evenly split
⇛ Header defined
⇛ Ranges set by interval

2.8 continued Changing the range settings

Range setting options

➳ If User defined Max/Min (fixed) is selected.

Nothing happens immediately. The next time you draw or contour a field in the file for which you have changed the range settings, you will get a menu asking you to enter a minimum and maximum value between which to draw or contour.

Current Minimum is	-18.0000
Current Maximum is	24.0000
Enter new minimum :	
Enter new maximum :	

Example of the menu you get. Type in the minimum value you want and hit return then type in the maximum you want and hit return. DISP will then go ahead and do the drawing or contouring operation with your new range settings

If you now do a second draw or contour the same range settings will be used again - the above menu will only appear the first time .
To disable this range setting - either hit Alt-U or choose another method from R.

➳ If User defined Max/Min (variable) is selected.

The same as for User defined Max/Min (fixed) except that the menu above will appear every time you draw or contour.

➳ If Header defined is selected.

The range settings will revert to the original default values for the next drawing or contouring operation.

➳ If Ranges set by interval is selected.

A menu will appear asking you to enter a minimum value and the size of the interval you require for each step in the range. These values are used next time you draw or contour. To disable the settings use the R key again.

If you wish to change the range setting for all like type files rather than just one file then use Alt-R instead of R. The same set of menus will be displayed.

2.9 Display a cursor, read values from the screen

Primary keys **Alt-P**, **F4** and **Alt-I**.

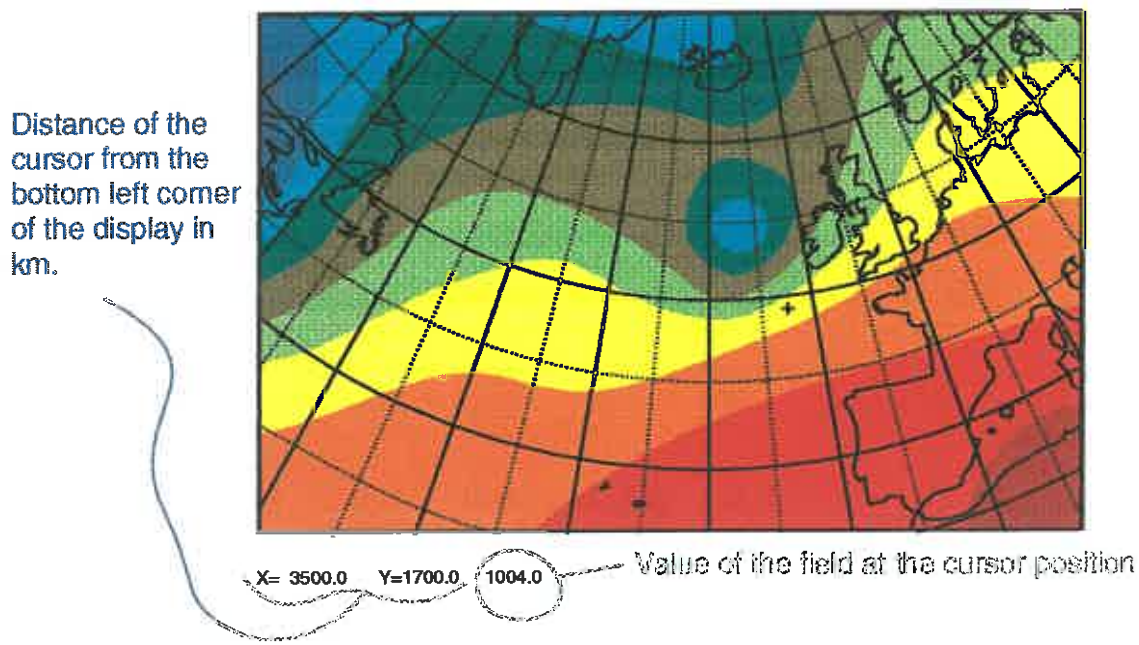
Alt-P To toggle between displaying or not displaying a cursor on the screen.
When a DISP session is started a cursor is NOT displayed.

To move the cursor round the screen use the ↔ arrow keys (or the mouse in some DISP sessions).

F4 To move the cursor over finer intervals. Choose # Fine Cursor Moves OFF from the menu using ↕ and Return to toggle to Fine Cursor Moves to be ON.

Alt-I To toggle between reading the value of the curent field (page 14) from the cursor position on the screen or not.
Alt-I will only work if a cursor is displayed.
The cursor position and the value of the field at the cursor position will appear at the bottom left of the screen

e.g.



2.10 Marking points on the screen using a cursor

Primary keys Return, Delete, F4, F5 and F7.

Return To mark a point on the screen at the location of the cursor. Up to 20 points can be marked If the cursor is toggled off using Alt-P any marked points will remain on the screen until the next drawing operation removes them. If the cursor is toggled back on then previously marked points will return to the screen.

Delete To remove from the screen the point most recently marked. This only works when the cursor is displayed. A new drawing operation must be performed to be able to see any points that have been removed.

F4 To join marked points together with a line. Choose # Joining Points from the menu using ↕ and Return to toggle Joining points to be on.

F5 To produce a cross-section graph through all marked points of the field you are currently at. The cross-section is from point to point, not a best fit line. Hit any key to remove the graph.

F7 To give a listing of the location of each marked point and the value at each point. e.g.

D0 = Distance from first to last point
D1 = Distance from second last to last point (km)

Point	X	Y	D0	D1	Value	Icon No.
1	100.0	200.0	0.0	0.0	12.3	1
2	400.0	600.0	500.0	500.0	18.2	1

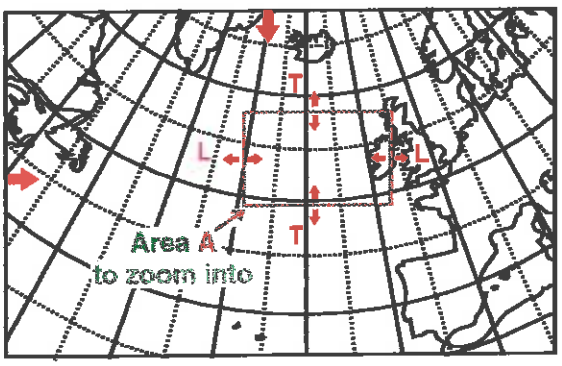
2.11 Zooming into a smaller area

Primary keys F1 (T, L and ↔↕) F2 and &

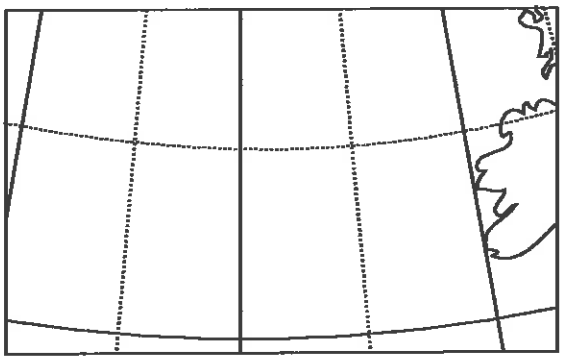
F1 To zoom into a smaller area. This key activates the boundaries of the DISP area and allows them to be moved with the cursor keys.

Suppose you want to zoom into area A below.

1. Draw a coastline (if you haven't already) using Ctrl-Y (page 10) If you don't draw a coastline first you will not be able to see a coastline when you zoom.
2. Hit F1 to activate the left and top boundaries.
3. The left boundary can now be moved using the ↔ keys. To activate the right boundary hit L - this can now be moved. Hit L again to toggle back to activating the left boundary.
4. The top boundary can be moved using the ↕ keys. To activate the bottom boundary hit T - this can now be moved. Hit T again to toggle back to activating the top boundary.
5. Hit Return - any picture or coastline you have on the screen will vanish. Re-draw the coastline and you will see that you have now zoomed into the new area.



Zoom into new area



New area displayed

If you wish to zoom into another different area F1 can be used again. After hitting F1 the full DISP area will be displayed and the edges of the box surrounding the existing zoom area will become active to move to define a new zoom area.

2.11 continued Zooming into a smaller area

Important points about using F1

1. If a model file is loaded in your DISP session then F1 zooming operations will act at the resolution of the DISP grid (page 2).
2. If a model file is loaded in your DISP session then by default F1 zooming operations will act on EVERY file loaded into DISP. If no model file is loaded then F1 will only act on the file/window you are currently at (pages 13-14).
   tip - If you wish to compare satellite and radar images then it is best to also load a model file.
3. If no model file is loaded in your DISP sesssion then F1 zooming operations will act at the resolution of the file you are currently at. This may be at the resolution of a satellite image or radar picture.
4. It is a good idea to zoom into an area which is roughly the same shape rectangle as your screen display to preserve the correct aspect ratio, as it is not otherwise maintained.

Other keys related to zooming

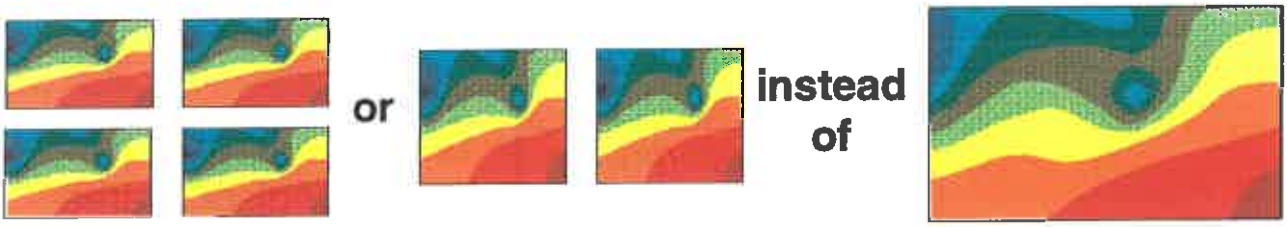
F2 To reset to the full DISP area. This key (like F1) will act on all files by default if a model file has been loaded.

& To toggle between F1 zooming operations acting on all files or just the file you are currently at.
This key only works if a model file has been loaded. (See point 2. above).
The first time you use the & key a box will appear like the one below. Subsequent F1 zooming will no longer act on all files unless the & key is used again.

2.12 Displaying several pictures on the screen

Primary key Alt-W

Instead of displaying 1 large picture on the screen, you may wish to display 2 or 3 or 4 or more smaller pictures. You may want to display in a square rather than a rectangle. e.g.



This is done with Alt-W

Alt-W Brings up a menu of options (see below) which allow you to choose the way in which windows are displayed on the screen.

Enter choice :

Single window - whole screen
2 windows evenly split in vertical
3 windows evenly split in vertical
4 windows evenly split in vertical
2 windows evenly split in horizontal
4 windows : one in each corner
2 windows : square, side by side
1 square window
Default — Superimposed windows: whole screen, 1 per file
Superimposed windows: 2 in each corner
Superimposed windows: 3 in each corner
User defined
Input attributes from a file
No change

Select your choice using the up/down cursor keys ↕ and Return. An explanation of what these choices are is given on the following pages.

2.12 continued Displaying several pictures on the screen

The first time a field is drawn in a DISP session the picture fills the whole screen. Any of the files loaded into a session can be displayed by first moving to that file (page 13). This is the default setting which is described in the Alt-W menu as:-

Superimposed windows: whole screen, 1 per file

window 1 (file 1) window 2 (file 2) : window 12 (file 12)

Rectangle represents the DISP display area

Suppose you want to have 4 pictures on the screen at the same time. There are 3 options in the Alt-W menu for doing this.

window 1 (file 1)	window 2 (file 2)
window 3 (file 3)	window 4 (file 4)

4 windows : one in each corner

File 1 can be displayed on the top left area, file 2 in the top right, file 3 in the bottom left and file 4 in the bottom right. Files 5 - 12 can't be displayed.

Superimposed windows : 2 in each corner

Files 1& 2 can be displayed on the top left area, files 3 & 4 in the top right, files 5 & 6 in the bottom left and files 7 & 8 in the bottom right. Files 9 - 12 can't be displayed.

window 1 (file 1) window 2 (file 2)	window 3 (file 3) window 4 (file 4)
window 5 (file 5) window 6 (file 6)	window 7 (file 7) window 8 (file 8)

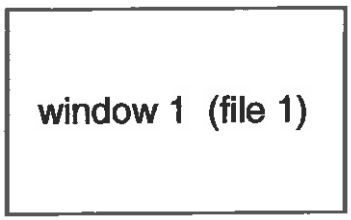
window 1 (file 1) window 2 (file 2) window 3 (file 3)	window 4 (file 4) window 5 (file 5) window 6 (file 6)
window 7 (file 7) window 8 (file 8) window 9 (file 9)	window 10 (file 10) window 11 (file 11) window 12 (file 12)

Superimposed windows : 3 in each corner

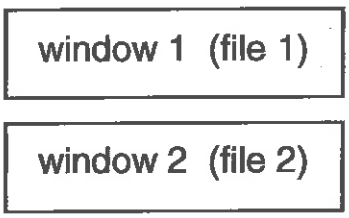
Files 1, 2 & 3 can be displayed on the top left area, files 4 , 5 & 6 in the top right, files 7, 8 & 9 in the bottom left and files 10, 11 & 12 in the bottom right.

2.12 continued Displaying several pictures on the screen

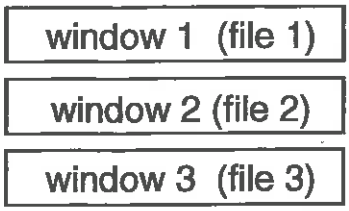
The other options in the Alt-W menu



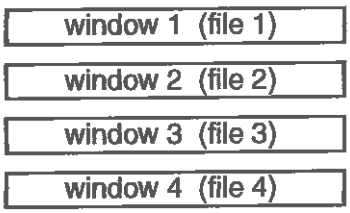
Single window - whole screen



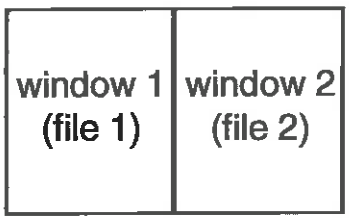
2 windows evenly split in vertical



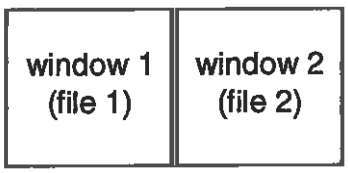
3 windows evenly split in vertical



4 windows evenly split in vertical



2 windows evenly split in horizontal



2 windows : square, side by side

1 square window

User defined
&
Input attributes from a file

Allow users to define their own areas. The use of these options is **not** covered in this guide. They are not necessary for almost all applications.

Important points about using Alt-W

Think about the order you load files into DISP if you intend to change the way windows are displayed.

If you intend to ZOOM all files into a smaller area, the zooming operation using F1 (page 23) should be performed BEFORE the use of Alt-W. The Alt-W key automatically sets the & function (page 24) to OFF. If you wish to perform a zoom on all files after using Alt-W you will have to use Alt-W again and choose the Superimposed windows: whole screen, 1 per file option, then hit &, then zoom using F1, then use Alt-W again.

2.12 continued Displaying several pictures on the screen

This page covers some other commands which are useful in their own right, but may be especially useful if you are displaying several windows on the screen at once.

Alt-D, Alt-C, Alt-V **To draw, contour or display vectors in all windows in window order.**

Alt-A **To alter links between files and windows and links between files. A menu is displayed.**

Current links are : (select to toggle)

1. Windows with files (TRUE)
2. Files (FULLY-linked) (FALSE)
3. Files (TIME-linked) (FALSE)
4. No change

A description of what these toggle options do is given below and on the next page.

1. **By default, when DISP is started, files are linked in numerical order to windows (page 13). Option 1. can be used to break this link so that it then becomes possible to re-link files to windows in a different order or even link a single file to several windows. An example of why this may be useful and what proceedure to follow is given below.**

   e.g. If you have used **Alt-W** to set up 4 windows : one in each corner (pages 25-26) but have loaded 5 files into DISP you will not be able to display the 5th file. To put the 5th file into the 1st window so it can be displayed do the following :-

   - With **Alt-A**, select option 1. with the ↕ cursor keys, hit **Return** to toggle Windows with files to FALSE
   - Go to window 1 using the key 1 (page 13)
   - Use **Alt-F** to select the 5th file from the file listing
   - With **Alt-A**, select option 1. to toggle Windows with files back to TRUE

   File 5 now replaces file 1as the file linked to window 1 and can be drawn, contoured etc in window 1.

Changing file/window links adds confusion - don't do it unless you have to!

2.12 continued Displaying several pictures on the screen

Options 2. and 3. from the Alt-A menu

2. **Files (FULLY-linked)**
   If toggled to TRUE then the use of the keys M, N, B, + and - (pages 14-16) to move around within files will act on all files rather than just the current file.

3. **Files (TIME-linked)**
   If toggled to TRUE then the use of the keys + and - (pages 14-16) to move forward or backwards to the next or previous field within a file will act on all files. This is frequently used to keep all model files at the same timestep as each other.

Further keys

? **To give information about each window in turn :**
What file is connected to that window (page 13,28)
If it is the current window you are at (pages 13-14)
The number of ranges set in that file (pages 19-20)
The current field in that file (pages 14-16)
What vectors are set (page 17-18)

/ **To get the same information as for ?, but only for the current window you are at.**

2.13 Other useful commands

F4 Brings up a general menu. Most useful options are:

Contour labeling	Toggle between labeling contours or not
Colour contours	Toggle between contours coloured according to value or only one single colour
Block drawing	Toggle between each grid square coloured as a block or a smooth interpolation
Arrow feathers	Toggle to on if you want arrow feathers on vectors - this may well be the best way of displaying vectors
Fine cursor moves	Toggle to on for fine cursor movements (page 21)

Contouring

F3 Change the contour type e.g. change to dashed contours

Ctrl-F8 Can add one or two decimal places to contour labels

Colours

Alt-J Change the colour palette. There are several options - give them a try. The grey shades palette is good for satellite imagery.

Ctrl-C Allows each of the 14 colours to be changed.

S Reverses the colours for the current file for the next drawing operation

Alt-S Reverses the colours immediatly and for all files

Ranges

**** To choose whether the drawing operation will colour just within the range set (pages 19-20) or also above or below that range.

Vectors

. To move to the next time for drawing vectors.

, To move to the previous time for drawing vectors

Miscellaneous

F6 To generate a histogram of the display area covered by each range interval for the current file.

2.14 How to save time loading files into DISP

It can be time consuming loading several files into DISP, especially if you are loading the same files every time. Here are some ways of saving some time.

Use of the F3 key to bring up the previous command

When you load files into DISP (page 7) the F3 key will display the previously typed filename, which can then be edited. This is particularly useful if all your files are located in the same directory and you don't wish to keep typing in the same directory path every time.

Adding a list of frequently used directories to the DISP.DEF file

A file called DISP.DEF is located in the C:\TP\DISP directory. The top line of this file is made up of a list of directory paths.
If a file is loaded into DISP by typing just the filename alone without a directory path, DISP will search through the list of directory paths in DISP.DEF for that file. If the file is found it is loaded into DISP. It is highly recomended that you add the directories you use most for storing DISP readable files to the list in DISP.DEF.

Loading into DISP a single 'hash' file that contains a list of files

If you are repeatedly running DISP with the same set of files, it may be easier to type all the files into a single file and just load the one file instead. It is possible to do this by using what are called hash files.

1. Create a directory called HASH under C:\ if it is not already there.
2. Create a new file in this directory to contain your list of files - call it whatever you want with 8 characters or less.
3. Edit your new file and type in all the files you wish to load into DISP - a new file per line. Type in the full directory paths unless already defined in DISP.DEF
4. Run DISP and enter the name of the new file you have created with a # in front of it.
   e.g. If a file called hello was created in the hash directory, it should be entered into DISP as #hello. Hit Return and all the files typed inside hello will be loaded into DISP.

2.15 Other features

This guide gives an introduction to what DISP can do, it does not cover everything. There are some more advanced features that have not been described. Some of the other things DISP can do are listed below so you can be aware of them. If you need to know any more you will need to use the menus to find out or ask someone who knows.

Adding and replacing files

It is possible to add or replace files during a DISP session. A file which is replaced must be replaced by a file of the same type and length. Use the spacebar and look under the files option. Added files are not linked to any window so the proceedure described on page 28 is required if you wish to link your new file to a window. Note - It may be easier in the end to start a new DISP session rather keep adding new files.

Allocating specific parts of the colour range to particular files

It is possible to split the colour palette between files. This would allow you for example to colour draw radar pictures on top of a satellite image in grey shades. It is not obvious from menus how to do this so you will need to ask for help.

Saving screens to memory and using overlays

DISP can save images to memory which can then be brought back and re-displayed in a subsequent DISP session. Use the spacebar and look under the Overlays and saving screens option.

Load in a file to perform several pre-defined DISP operations with one single key press

You can write your own 'key sequence files' to contain sets of DISP commands. These files, when loaded into your DISP session allow frequently used key combinations to be performed more quickly and efficiently. Key sequence files can also be very useful for generating animation sequences more easily. You will need to get hold of documentation and ask for help if you want to start getting into the world of key sequence files.

Printing

It is not possible to produce hard-copy printouts directly as a function of DISP. You will require software on the PC to capture an image on the screen and send it to a printer. Ask your system manager.

3.1 How to create animations from DISP

DISP itself will not run animations. The animation frames are created by DISP. A program called ANIMA is then used to display those frames as an animation sequence. More about ANIMA on page 35.

Animation frames are stored as .SCR files; additional information for ANIMA is stored in a .TXT file. All these files are contained in directories under C:\PICTURES.

There are two ways to create an animation from DISP.

1. Create each frame manually.
2. Create a whole sequence automatically.

1. To create an animation frame by frame - display the first picture you want to save then type **T**.
   A menu will appear asking you to choose a directory or create a new directory. If you choose to create a new directory you will be asked for a directory name - eight characters maximum!
   Once you have selected/created a directory you will be asked to give a name for your animation. The name of the animation must be **no more than 6 characters long and the last character must NOT be numerical**. Type in a name for your animation then hit **Return** and you will be asked to type in a description of what your animation sequence is - 14 characters maximum! Type in your description and hit **Return** (or just hit **Return** if you don't want to type a description) and the first animation frame is saved.
   Now you can save any other pictures you wish using **T** and they will be appended to the same animation.

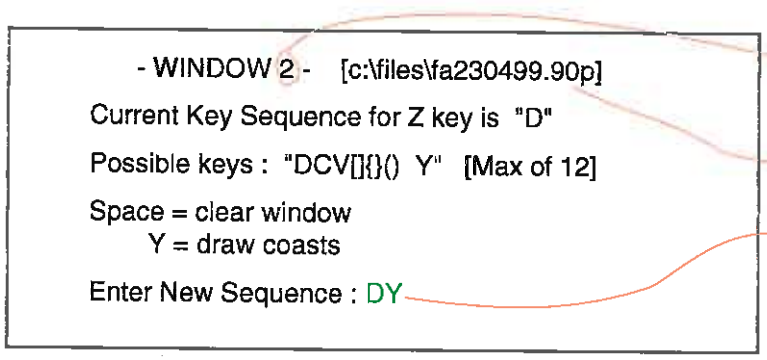
2. To create a whole animation sequence automatically -
   Firstly you need to set up the windows you are going to use and the operations to be performed in each window, then you can generate an animation sequence. The first step involves using three commands **Ctrl-O**, **Alt-X** and **Alt-Z** in that order.

   Ctrl-O To set up the windows you wish to use and the order you want to use them in. A scary looking box will appear asking for you to Enter New Order below : All you have to do is type in the numbers of the windows you wish to use (pages 13,28) in the order you will be using them. Example: If for your animation you want to draw a field from window 2, then contour on top from window 1, then contour another field from window 3 ... you type **213** **Return**. (Don't worry about the rest, it's too advanced for this guide.)

3.1 continued How to create animations from DISP

Creating a whole sequence automatically continued

Alt-X To set up the key commands (draw, contour etc) for each of the windows you are going to use. A box will appear :



Key commands apply to window 2 in this example.

File attached to window 2

Type DY if you wish to draw from window 2 then generate a coastline. (C[would be to contour from window 2 then contour between each contour from window 2)

Type in the key commands you want (they will appear after Enter New Sequence :) and hit Return. A new box will then appear for the next window you are going to use .. and so on.

Alt-Z To get a preview of the first frame in your animation. This key will perform the key commands you set up using **Alt-X** for the windows you are using (set with **Ctrl-O**). You will of course have to go to the correct position in each of the windows (files) you are using (pages 14-16) to display the fields you wish to display.

Now you can generate an animation :

A To generate an animation sequence using the windows and commands you have just set up.
You will be asked for a directory and filename in the same way as if you are creating an animation frame by frame using **T**.
Next you will be asked to enter a step for the animation sequence. Hit **Return** if you want an animation step of 1 - this means that every file /window will step to the next field/timestep before the next frame is generated. If you entered **2 Return** each file/window will step 2 fields /timesteps forward before the next frame is generated.
You will be asked for the number of pictures/frames required. (The number of pictures required to animate all the times for a variable in a model file is 8 for analysis files and 17 for forecast files (pages 3-6)).
Enter a number of pictures, hit **Return** and an animation will be generated before your eyes.

Ctrl-T Use if you wish to create a new animation sequence from a DISP session in which you have already generated an animation, otherwise the new animation will just be appended to the old with the same name.

3.2 Using the program ANIMA to run DISP generated animations

ANIMA, like DISP, is a program written in turbo pascal for PC's. It is used to run animation sequences which have previously been set up in DISP.

Starting ANIMA

As with DISP, the way you start ANIMA is dependent on the way the PC you are using is set up. Usually you will be able to type ANIMA from a MS-DOS prompt (case does not matter) or double click on the appropriate icon in windows.

Selecting the animation you want

Once you have started ANIMA you will get a large message on the screen telling you that you are in ANIMA and to hit any key to continue. Follow the instruction and hit any key. A list of directories will then be displayed. These directories are sitting under the C:\PICTURES directory on the PC. Select the directory which contains the animation frames you want to look at. (If you created an animation sequence using DISP on the same PC you will have generated the animation files in one of these listed directories). Now select the animation sequence you want to look at. The first frame of the animation should now be displayed (though not always).

ANIMA commands

W To toggle between running or not running the animation. Hit **W** and the animation will start, hit **W** again and it will stop.
N To move to the next frame. The animation should not be running.
B To move to the previous frame. The animation should not be running.
Q To quit ANIMA. This works even if the animation is running.

G To go back to the directories menu. The animation should not be running.
M To go to a particular frame. The animation should not be running.
V Toggles between **W** running just forwards or running forwards and backwards. The animation should not be running.
F1 Brings up a menu of commands.

4.1 DISP Guide Quick reference sheet 1

Essential to know (p 8-9)

Space bar To access menus of the commands

F12 or shift F2 To clear the current display area.

F10 To toggle between the two available screens

Q To quit DISP

Drawing and contouring (p 9)

D To Draw

C To contour

Ctrl-A To change contour colour (then use up/down cursor keys)

Coastlines (p 10-12)

Ctrl-Y To draw coastline

E To toggle between automatic and manual coastline drawing

Ctrl-B To change the coastline colour (then use up/down cursor keys)

Moving to another file or another field within a file (p 13-16)

F To show a list of files

M To show a list of fields within the file you are looking at.

N To go forward to the next variable for the same time.

B To go backwards to the previous variable for the same time.

\+ To go forward to the next time

\- To go backwards to the previous time

U To change the step. (If the step is set to 1 then N and + do the same thing, likewise for B and -)

Range settings for drawing and contouring (p 19-20)

R To set new ranges for a single file.

Alt-R To set new ranges for all files.

4.1 DISP Guide Quick reference sheet 2

Vectors (p17-18)

Ctrl-W	To set up vectors
V	To draw vectors
Ctrl-D	To change vector colour (then use up/down cursor keys)
F14 or shift F4	To standardise vector lengths

Display a cursor and read information from the screen (p 21)

Alt-P	To toggle between showing or not showing the cursor
Alt-I	To display the value of the field at the cursor location. (if cursor showing)
F4	To set the cursor to move over a finer interval. Choose Fine cursor Moves from the menu to toggle on - use F4 again to toggle off.

Zoom into a smaller area (p 23-24)

F1	To create your own zoom area
L	To toggle between left or right boundary
T	To toggle between top or bottom boundary
	Use cursor keys to move up/down/left/right
&	Toggle between applying zoom with F1 to all files or only one (default is all files if model files have been loaded into DISP)
F11	To zoom into an already pre-defined area. Choose the area you want.
F2	To reset to full area

Display more than 1 window on the screen (p 25-29)

Alt-W	To choose to display more than 1 window on the screen. Files will be displayed in the order they are loaded into DISP - It is worth thinking about the order files are loaded if you wish to display more than 1 window.

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